

## **SECTION 15100 - VALVES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes general duty valves common to several mechanical piping systems.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Special purpose valves are specified in Division 15 piping system Sections.
  - 2. Valve tags and charts are specified in Division 15 Section "Labeling and Identifying."

#### **1.3 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.
- C. Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

#### **1.4 QUALITY ASSURANCE**

- A. Single-Source Responsibility: Comply with the requirements specified in Division 1 Section "Materials and Equipment," under "Source Limitations" Paragraph.
- B. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- C. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, grooves, and weld ends.
  - 3. Set globe and gate valves closed to prevent rattling.
  - 4. Set ball and plug valves open to minimize exposure of functional surfaces.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Gate Valves:
    - a. Crane Company; Valves and Fitting Division.
    - b. Hammond Valve Corporation.
    - c. Lunkenheimer/Cincinnati Valve Co.
    - d. Milwaukee Valve Company, Inc.
    - e. NIBCO Inc.
    - f. Powell: Wm. Powell Company (The).
    - g. Red-White Valve Corp.
    - h. Stockham Valves & Fittings, Inc.
  2. Ball Valves:
    - a. Conbraco Industries, Inc.; Apollo Division.
    - b. Hammond Valve Corporation.
    - c. Milwaukee Valve Company, Inc.
    - d. NIBCO Inc.
    - e. Stockham Valves & Fittings, Inc.
    - f. Tyler Pipe.
    - g. Victaulic Company of America.
  3. Globe Valves:
    - a. Crane Company; Valves and Fitting Division.
    - b. Hammond Valve Corporation.
    - c. Lunkenheimer/Cincinnati Valve Co.
    - d. Milwaukee Valve Company, Inc.
    - e. NIBCO Inc.
    - f. Powell: Wm. Powell Company (The).
    - g. Red-White Valve Corp.
    - h. Stockham Valves & Fittings, Inc.
  4. Butterfly Valves:
    - a. Grinnell Corp.
    - b. Keystone Valve USA, Inc.
    - c. Milwaukee Valve Company, Inc.
    - d. NIBCO Inc.
    - e. Red-White Valve Corp.
    - f. Stockham Valves & Fittings, Inc.
    - g. Tyler Pipe.
    - h. Victaulic Company of America.
  5. Swing Check Valves:
    - a. Cla-Val Co.
    - b. Crane Company; Valves and Fitting Division.
    - c. Hammond Valve Corporation.
    - d. Lunkenheimer/Cincinnati Valve Co.
    - e. Milwaukee Valve Company, Inc.
    - f. NIBCO Inc.
    - g. Powell: Wm. Powell Company (The).
    - h. Red-White Valve Corp.
    - i. Stockham Valves & Fittings, Inc.
    - j. Victaulic Company of America.

## 2.2 BASIC, COMMON FEATURES

- A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.
  - 1. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.
- B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.
- C. Sizes: Same size as upstream pipe, unless otherwise indicated.
- D. Operators: Use specified operators and handwheels, except provide the following special operator features:
  - 1. Handwheels: For valves other than quarter turn.
  - 2. Lever Handles: For quarter-turn valves 6 inches (DN150) and smaller, Furnish Owner with 1 wrench for every 10 plug valves.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- G. Threads: ASME B1.20.1.
- H. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.
- I. Solder Joint: ASME B16.18.
  - 1. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F (450 deg C) for gate, globe, and check valves; below 421 deg F (216 deg C) for ball valves.

## 2.3 GATE VALVES

- A. Gate Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi (1380-kPa) cold working pressure (CWP), or Class 150, 300-psi (2070-kPa) CWP; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
- B. Gate Valves, 3 Inches (DN80) and Larger: MSS SP-70, Class 125, 200-psi (1380-kPa) CWP, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with 2-piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

## 2.4 BALL VALVES

- A. Ball Valves, 4 Inches (DN100) and Smaller: MSS SP-110, Class 150, 600-psi (4140-kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch (DN15) valves and smaller and conventional port for 3/4-inch (DN20) valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections:
  - 1. Operator: Vinyl-covered steel lever handle.
  - 2. Stem Extension: For valves installed in insulated piping.

## 2.5 GLOBE VALVES

- A. Globe Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi (1380-kPa) CWP, or Class 150, 300-psi (2070-kPa) CWP; ASTM B 62 cast-bronze body and screwed bonnet, rubber, bronze, or teflon disc, silicon bronze-alloy stem, teflon-impregnated packing with bronze nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
- B. Globe Valves, 3 Inches (DN80) and Larger: MSS SP-85, Class 125, 200-psi (1380-kPa) CWP, ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

## 2.6 BUTTERFLY VALVES

- A. Butterfly Valves: MSS SP-67, 200-psi (1380-kPa) CWP, 150-psi (1035- kPa) maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals, wafer, lug, or grooved style:
  - 1. Disc Type: Nickel-plated ductile iron.
  - 2. Operator for Sizes 2 Inches (DN50) to 6 Inches (DN150): Standard lever handle.
  - 3. Operator for Sizes 2 Inches (DN50) to 6 Inches (DN150): Standard lever handle with memory stop.

## 2.7 CHECK VALVES

- A. Swing Check Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi (1380-kPa) CWP, or Class 150, 300-psi (2070-kPa) CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections:
- B. Swing Check Valves, 3 Inches (DN80) and Larger: MSS SP-71, Class 125, 200-psi (1380-kPa) CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.
- D. Examine threads on valve and mating pipe for form and cleanliness.

- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

### 3.2 INSTALLATION

- A. Install valves as indicated, according to manufacturer's written instructions.
- B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- D. Locate valves for easy access and provide separate support where necessary.
- E. Install valves in horizontal piping with stem at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. Installation of Check Valves: Install for proper direction of flow as follows:
  - 1. Swing Check Valves: Horizontal position with hinge pin level.

### 3.3 SOLDERED CONNECTIONS

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.
- D. Open gate and globe valves to fully open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.
- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

**3.4 THREADED CONNECTIONS**

- A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.
- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

**3.5 FLANGED CONNECTIONS**

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

**3.6 VALVE END SELECTION**

- A. Select valves with the following ends or types of pipe/tube connections:
  - 1. Copper Tube Size, 2-1/2 Inches (DN65) and Smaller: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
  - 2. Steel Pipe Sizes, 2-1/2 Inches (DN65) and Smaller: Threaded or grooved end.
  - 3. Steel Pipe Sizes, 3 Inches (DN80) and Larger: Grooved end or flanged.

**3.7 APPLICATION SCHEDULE**

- A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements.
- B. Domestic Water Systems: Use the following valve types:
  - 1. Gate Valves: Class 125, bronze or cast-iron body to suit piping system.
  - 2. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension.
  - 3. Globe Valves: Class 125, bronze or cast-iron body to suit piping system, and bronze or teflon disc.
  - 4. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or elastomer-coated ductile iron disc; EPDM or Buna N sleeve and stem seals.
  - 5. Bronze Swing Check: Class 125, with rubber seat.
  - 6. Check Valves: Class 125, swing or wafer type as indicated.

- C. Heating Water Systems: Use the following valve types:
1. Gate Valves: Class 150, bronze or cast-iron body to suit piping system.
  2. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension and memory stop.
  3. Globe Valves: Class 150, bronze or cast-iron body to suit piping system, and bronze disc.
  4. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or epoxy-coated ductile iron disc; EPDM sleeve and stem seals (high temperature rated).
  5. Bronze Swing Check: Class 150, with composition seat.
  6. Check Valves: Iron swing, wafer, or lift type, as indicated. Swing check shall be Class 150 with bronze seat ring.
- D. Chilled-Water Systems: Use the following valve types:
1. Gate Valves: Class 150, bronze body; or Class 125, cast-iron body.
  2. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension and memory stop.
  3. Plug Valves: Buna N packing.
  4. Globe Valves: Class 125, bronze body with bronze or teflon disc; or Class 125, cast-iron body.
  5. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or elastomer-coated ductile iron disc; EPDM sleeve and stem seals.
  6. Check Valves: Class 125, bronze body swing check with rubber seat; Class 125, cast-iron body swing check; Class 125, cast-iron body wafer check; or Class 125, cast-iron body lift check.
- E. Low-Pressure Steam and Condensate Return Systems: Use the following valve types:
1. Gate Valves: Class 150, bronze body; or Class 125, cast-iron body.
  2. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension.
  3. Plug Valves: Viton or teflon packing.
  4. Globe Valves: Class 150, bronze body with teflon disc; or Class 125, cast-iron body.
  5. Check Valves: Class 150, bronze body swing check with composition seat; Class 150, cast-iron body swing check with bronze seat ring; or Class 125, cast-iron body wafer check.

### 3.8 ADJUSTING

- A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION 15100